

### **REMARKS**

This is in response to the Office Action mailed on August 11, 2004.

Claims 25, 33, and 42 are amended, claims 46-72 are canceled without prejudice or disclaimer, and no claims are added; as a result, claims 1-45 are now pending in this application. A divisional application containing subject matter relating to claims 46-72 was filed on August 31, 2004, as Serial No. 10/931,340. The amendments to the claims are fully supported by the specification as originally filed. No new matter is introduced. The amendments are made to clarify the claims. Applicant respectfully requests reconsideration of the above-identified application in view of the amendments above and the remarks that follow.

#### **Objections to the Claims**

Claims 25, 33, and 42 were objected to because of the informalities. To expedite prosecution of the instant application, claims 25, 33, and 42 are amended. Applicant respectfully requests withdrawal of these objections to claims 25, 33, and 42, and reconsideration and allowance of these claims.

#### **First §103 Rejection of the Claims**

Claims 1-16 were rejected under 35 USC § 103(a) as being unpatentable over Haukka et al. (U.S. 2004/0043557) in view of Smith et al.(U.S. 6,683,011) and Ohmi et al. "Rare Earth Metal Oxides for High-K gate insulator", Proceedings - Electrochemical Society, Vol. 1, p. 376-387 (2002). Applicant traverses these rejections of these claims.

Applicant reserves the right to right to swear behind Haukka et al. (hereafter Haukka), Smith et al.(hereafter Smith) and Ohmi et al.(hereafter Ohmi)

Applicant cannot find in the combination of Haukka, Smith, and Ohmi a teaching or suggestion of a method of forming a dielectric layer including forming a layer of hafnium oxide by chemical vapor deposition and forming a layer of a lanthanide oxide by electron beam evaporation, where the layer of hafnium oxide is adjacent to and in contact with the layer of lanthanide oxide, as recited in claim 1. Haukka deals with forming a layer of aluminum oxide or lanthanum oxide with other dielectric materials that may include hafnium oxide, where the aluminum oxide or lanthanum oxide formation is conducted by atomic layer deposition. Smith

deals with forming a layer of hafnium oxide by chemical vapor deposition (CVD). Ohmi deals with lanthanide oxides including forming the lanthanide oxides by electron beam deposition. However, Applicant cannot find in these references cited by the Office Action, individually or combined, a teaching, suggestion, or motivation to form a portion of a dielectric layer by a CVD method and another portion of the same dielectric layer by electron beam evaporation, as recited in claim 1.

In the Office Action, it is stated

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Haukka and form the hafnium oxide film by the CVD process for the benefit of forming the impurity free film from a single source precursor as taught by Smith in column 1, lines 24-40. ...

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Haukka and form the lanthanide oxide by electron beam evaporation for the benefit of providing purity and controlling damage to the deposited film as taught by Ohmi in Chapter II under the heading "Experiments" in page 377.

Applicant respectfully disagrees for several reasons. First, the modification of Haukka as proposed in the above quote does not consider claim 1 as a whole. Applicant submits that citing Haukka's ALD formation of a structure having lanthanum oxide and hafnium oxide, citing Smith's CVD formation of hafnium oxide, and citing Ohmi's electron beam evaporation of a lanthanide oxide only considers the differences between the cited prior art and claim 1, but does not consider whether claim 1 as a whole would have been obvious. In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985); MPEP § 2141.02.

Secondly, the fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); MPEP § 2143.01. From the above quote from the Office Action, it is proposed that to "form the lanthanide oxide by electron beam evaporation for the benefit of providing purity and controlling damage to the

deposited film as taught by Ohmi in Chapter II under the heading “Experiments” in page 377.” However, Ohmi recites under the heading “Experiments”: “[e]-beam deposition method has some advantageous compared to CVD or sputtering in terms of purity and damage in the deposited films, respectively.” Further, Applicant submits that atomic layer deposition is a different process than CVD or sputtering and that Ohmi lacks a comparison of atomic layer deposition with e-beam deposition. In addition, Haukka notes that ALD processing provides “excellent control; extremely thin, uniformly thick layers can be formed without pinholes.” (*See, Haukka, paragraph [0006]*) Therefore, Applicant submits that the cited art does not suggest the desirability of modifying Haukka from forming a lanthanide oxide by ALD to forming the lanthanide oxide by electron beam evaporation as proposed in the Office Action.

Thirdly, as previously noted, Ohmi recites “[e]-beam deposition method has some advantageous compared to CVD or sputtering in terms of purity and damage in the deposited films, respectively.” This quote is a general proposition by Ohmi and is not limited to rare earth metal oxides, but may be applied to other materials such as hafnium oxide. Thus, Applicant submits that Ohmi effectively teaches away from forming hafnium oxide by a CVD process, in that one skilled in the art on review of Ohmi would be led in a direction divergent from Smith and form both a hafnium oxide and a lanthanide oxide by e-beam evaporation in a dielectric layer containing the two metal oxides. A factor cutting against a finding of motivation to combine or modify the prior art is when the prior art teaches away from the claimed combination. A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path the applicant took. *In re Gurley*, 27 F.3d 551, 31 USPQ 2d 1130, 1131 (Fed. Cir. 1994); *United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966); *In re Spinnoble*, 405 F.2d 578, 587, 160 USPQ 237, 244 (C.C.P.A. 1969); *In re Caldwell*, 319 F.2d 254, 256, 138 USPQ 243, 245 (C.C.P.A. 1963). Therefore, Applicant submits that the combination of Ohmi with Haukka is improper, since there is no motivation to combine these two references.

For at least the reasons discussed above, Applicant submits that claim 1 is patentable over Haukka in view of Smith and Ohmi. For similar reasons, Applicant submits that claim 12 is patentable over Haukka in view of Smith and Ohmi. Claims 2-11 and claims 13-14 depend on

claims 1 and 12, respectively, and are patentable over Haukka in view of Smith and Ohmi for at least the reasons stated above.

Applicant respectfully requests withdrawal of these rejections to claims 1-16, and reconsideration and allowance of these claims.

Second §103 Rejection of the Claims

Claims 17-45 were rejected under 35 USC § 103(a) as being unpatentable over Banerjee (U.S. 6,699,745) in view of Haukka (U.S. 2004/0043557), Smith (U.S. 6,683,011) and Ohmi "Rare Earth Metal Oxides for High-K gate insulator", Proceedings - Electrochemical Society, Vol. 1, p. 376-387 (2002). Applicant traverses these rejections of these claims.

For reasons similar to those stated above with respect to claim 1, Applicant submits that independent claims 17, 21, 29, and 37 are patentable over Haukka in view of Smith and Ohmi. In the Office Action, it is stated that "Banerjee fails to teach ... forming a layer of hafnium oxide by chemical vapor deposition; and forming a layer of a lanthanide oxide by electron beam evaporation." Therefore, Applicant maintains that Banerjee fails to cure the deficiencies of citing Haukka, Smith, and Ohmi with respect to claims 17, 21, 29, and 37, and that the combination of Banerjee, Haukka, Smith, and Ohmi does not establish a proper *prima facie* case of obviousness with respect to claims 17, 21, 29, and 37. Thus, Applicant submits that independent claims 17, 21, 29, and 37 are patentable over Banerjee, Haukka, Smith, and Ohmi for at least the reasons discussed herein. Further, the claims that depend on independent claims 17, 21, 29, and 37 are patentable over Banerjee, Haukka, Smith, and Ohmi for at least the reasons discussed herein.

Applicant respectfully requests withdrawal of these rejections to claims 17-45, and reconsideration and allowance of these claims.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 371-2157 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

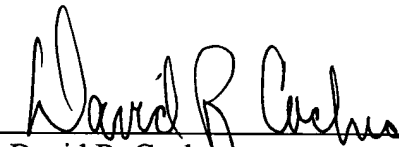
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Date 12 November 2004

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: MS Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 12 day of November, 2004.

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